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**1 FEBRUARY 1979**

**(FOUO 7/79)**

**1 OF 1**

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JPRS L/8258

1 February 1979

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY  
PHYSICAL SCIENCES AND TECHNOLOGY  
(FOUO 7/79)



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TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY  
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(FOUO 7/79)

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GEOPHYSICS, ASTRONOMY AND SPACE

'TASS' PUBLISHES FIRST PHOTOS OF VENUS PROBES

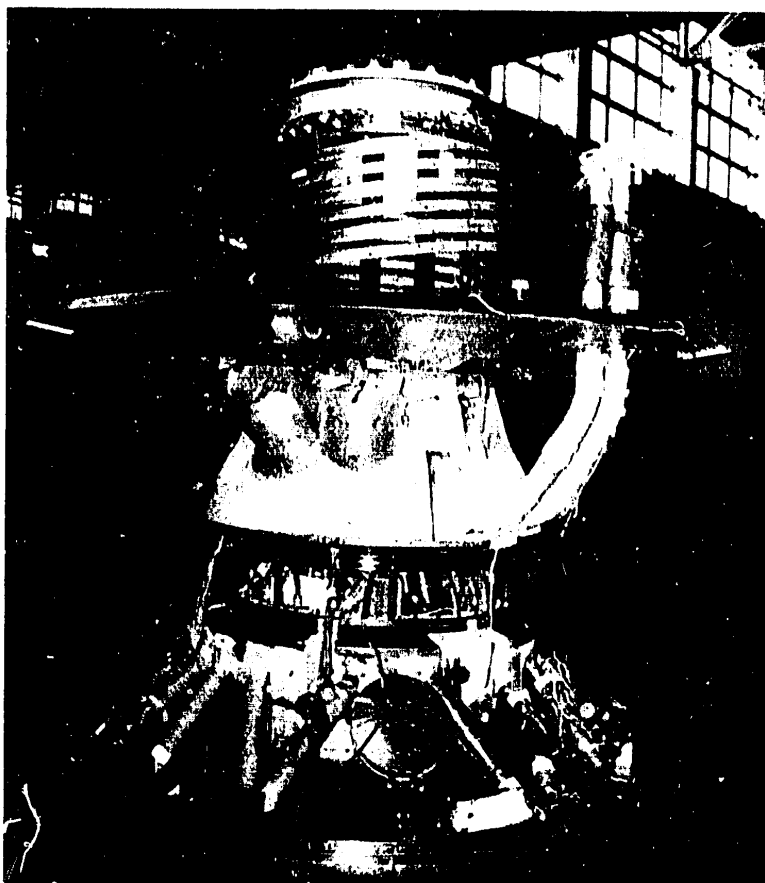
Paris AIR ET COSMOS in French 6 Jan 79 p 37

[Article by P. L.: "Venera-11 and -12"]

[Text] The Soviet news agency TASS has just published the first photographs of the "Venera-11 and "Venera-12" probes, which landed last month on the planet Venus (Cf. AIR ET COSMOS, Nos 745 and 746). The probes released by each satellite are identical and carry the same instruments, which are intended principally for the chemical analysis of the Venusian atmosphere. The photograph shown here depicts one of the probes in the assembly and testing hall (in landing position, sitting on the circular shock absorbing device). Note the aerodynamic stabilization shield at the top.

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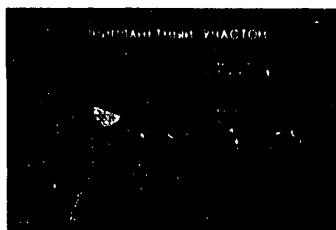


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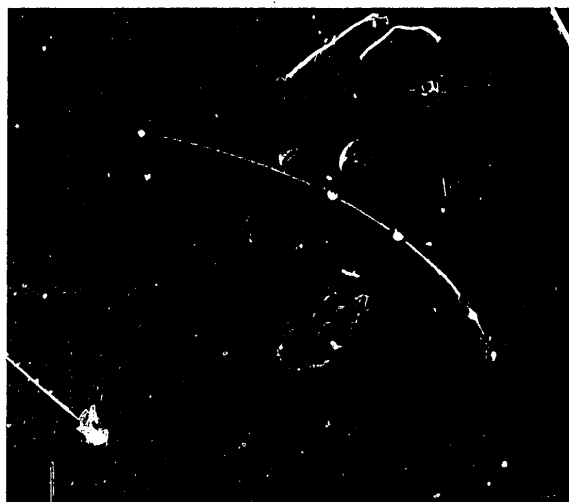


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In the other photographs, the trajectories of the "Venera" probes are shown on the screen at the Soviet Flight Control Center. In the photograph below: "Venera-12," which was launched on 14 September 1978, traveled the 240 million kilometers to Venus in 98 days. The probe released by the satellite landed on the surface of Venus at 0630 hours Moscow time on 21 December and continued to function for 110 minutes. "Venera-11," which was launched on 9 September, also released a probe, which landed at 0620 hours Moscow time on 25 December and functioned for 95 minutes (in 1975 "Venera-9" and "Venera-10" transmitted for 53 and 65 minutes).

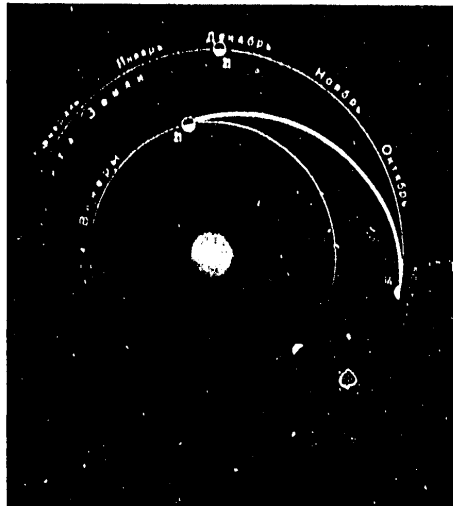


The next photograph depicts the "Venera-11" descent sequence: release (2 days before arrival) and penetration into the atmosphere (at 11.2 km/s), aerodynamic deceleration (at an altitude of about 40 kilometers), ejection of the jettison and main parachutes and landing. The "Venera-12" landing trajectory, which can be traced from an altitude of 62 kilometers, is comparable. The probes landed on the illuminated side of the planet 800 kilometers apart.



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In the photograph below: the relationship between "Venera-11" and the satellite orbiting at 35,000 kilometers (the earth is not visible at this moment).



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GEOPHYSICS, ASTRONOMY AND SPACE

UDC 550.812:553.98(-925.22)

RESULTS FROM AND GOALS FOR REGIONAL GEOLOGICAL AND GEOPHYSICAL WORK IN THE CASPIAN DEPRESSION

Moscow GEOLOGIYA NEFTI I GAZA in Russian No 10, 1978 pp 1-5

[Article by N. V. Nevolin, P. A. Blokhin, V. M. Kudymov, S. S. Maksimov (Soyuzgeofizika), G. Ye.-A. Ayzenshtadt, M. G. Aristov (VNIGRI), L. G. Kiryukhin, Yu. A. Ivanov (VNIGRI), T. N. Dzhumagaliyev (KazNIGRI), D. L. Fedorov (NVNIIGG), and T. K. Nsanov [deceased] (Kazneftegasrazvedka)]

[Text] The Basic Directions for Development of the USSR National Economy in 1976-1980 call for accelerated detection and exploration of new deposits of petroleum, natural gas and condensate in the most promising regions, including the Caspian depression. Regional geological-geophysical investigations have a vital role in the successful solution of this national economic problem. Significant features of the underlying structure of the Caspian depression have been distinguished in the course of correlating regional geological and geophysical work. In areas near the side of the depression, on the surface of the base, favorable large, buried structures have been spotted or confirmed: Temirskiy, Zharkamysskiy, Biikzhal'skiy, Astrakhanskiy and Troitskiy protrusions, Severo-Kaspiyskiy and Ozinkovski uplift zones and more (Figure 1), which may be promising with respect to the presence of oil and gas in subsalt deposits.

Regional productivity of the subsalt complex (mainly lower Permian) within the boundaries of all border zones of the Caspian depression has been confirmed by parametric and exploratory drilling. A number of oil and gas deposits of industrial significance have been discovered here: northern edge-Zapadno-Teplovskoye, Borodinskoye, Vostochno-Gremyachinskoye and others; eastern-Kenkiyaskoye and Karatyubinskoye; southern-Tortayskoye and Tazhigalinskoye; southwestern-Astrakhanskoye; western-Lobodinskoye, Komsomolskoye and others.

At the same time, substantial shortcomings are noted in the conduct of the regional geophysical work:

1. insufficient concentration of work in the most promising (in light of recent data) directions and low volume of investigations;
2. lack of a uniform procedure for field geophysical observations and their interpretation, which makes the analysis and correlation of the resulting material difficult;

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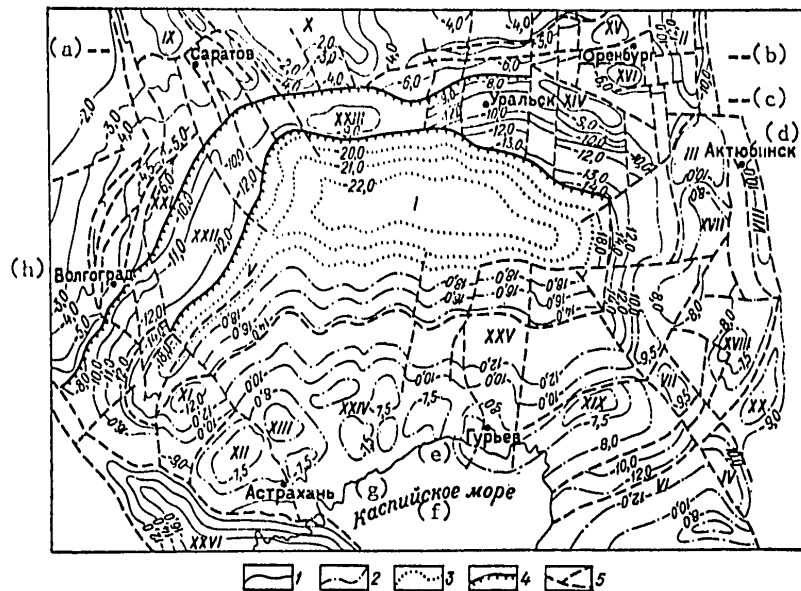


Figure 1. Relief Map of the Caspian Depression Base

Isohypses, km: 1-surfaces of Preriphean base (in places, probable); 2-refracting seismic surface,  $V_g=6.2-6.5$  km/s (hypothetically corresponds to Predevonian erosion structure surface, according to data of N. V. Nevolin); 3-same, for  $V_g=6.7-7.0$  km/s (probable "basalt" stratum); 4-tectonic escarpments; 5-faults manifested in base relief.

Major tectonic elements. Depressions: I-Caspian central part; II-Belskiy; III-Yaysanskiy; IV-Kosbulakskiy. Foredeeps: V-Sarpinskiy; VI-Tugarakchanskiy; VII-Dzhanterekskiy; VIII-Primugodzharskiy. Protrusions: IX-Aktarskiy; X-Pugachevskiy; XI-Prisarpinskiy; XII-Astrakhanskiy; XIII-Zavolzhskiy; XIV-Troitskiy; XV-Syrtoyskiy; XVI-Sol'-Iletskiy; XVII-Temirskiy; XVIII-Zharkamysskiy; XIX-Biikzhal'skiy; XX-Tereskenskiy. Uplift zones: XXI-Kamyshinsko-Balykleyskiy; XXII-Dzhanybekskiy; XXIII-Ozinkovskiy; XXIV-Severo-Kaspiyskiy; XXV-Taysuganskiy tectonic area; XXVI-Donetskiy graben.

Geographic names: a-Saratov; b-Orenburg; c-Ural'sk; d-Aktyubinsk; e-Gur'yev; f-Caspian Sea; g-Astrakhan'; h-Volgograd.

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3. unsatisfactory depth of geophysical (seismic) investigations--estimates of the thickness of subsalt deposits and structures not consistently reliable;
4. deep parametric boring takes care of only the uppermost part of the subsalt profile; a full set of geological-geophysical investigations is not conducted in all boreholes, and the quality leaves something to be desired.

For the aforementioned reasons, the zones which show promise are not opportunely ready for geophysical prospecting and drilling operations.

Exploratory drilling is at present concentrated mainly in the narrow border zone of the Caspian depression. Exploratory wells, as a rule, are sunk on a structural basis constituted according to seismic level  $P_1$ , which does not, in all cases, reflect the subsalt structure; and this lowers the effectiveness of the exploratory drilling.

Taking into consideration the material from investigations done in 1976-1977 and the correlated work of the All-Union Scientific Research Institute of Geophysical Exploration Methods (VNIIGeofizika), the All-Union Petroleum Scientific Research Institute of Geological Exploration (VNIGRI [Leningrad]), the All-Union Petroleum Scientific Research Institute of Geological Exploration (VNIGNI [Moscow]), the Lower Volga Scientific Research Institute of Geology and Geophysics (NVNIIGG), and KazNIGRI [expansion unknown], as prime objects for regional study we recommend the Temirskiy, Zharkamysskiy, Biikzhal'skiy, Astrakhanskiy and Troitskiy base protrusions and the Severo-Kaspiyskiy, Kamyshinsko-Balykleyskiy and Ozinkovski uplift zones (see Figure 1). The tectonic element boundaries should be refined, the structural and lithological facies characteristics of the subsalt complexes should be studied, the physical parameters of the rock should be determined, the location of major faults established and so on.

On the eastern edge of the depression, the Temirskiy, Zharkamysskiy and Karaulkel'dinskiy uplifts' structure and boundaries remain as yet unclear for the most part. The structural plots made according to seismic level  $P_1$  do not always correctly reflect the structure of a subsalt complex, and the structure has been studied altogether inadequately according to levels  $P_2$  and  $P_3$ . Parametric boreholes on the Zharkamysskiy and Temirskiy uplifts revealed for the most part only Prekurgurian Lower Permian formations.

It is obvious, therefore, that regional geological-geophysical work on these three structures should be continued. It is recommended that MOGT [expansion unknown] seismic observations be run on lines transverse to the course of the uplifts, and that four parametric wells be drilled in order to reveal Carboniferous deposits and one (6 km) to reveal Devonian deposits (Figure 2).

The Biikzhal'skiy (Kul'sary) protrusion has been studied by means of a sparse network of seismic profiles and a single deep well (there are no data for compilation of a structural chart by the  $P_2$  and  $P_3$  seismic boundaries, nor even by the  $P_1$  level). Meanwhile, it is deserving of special attention because it is in a region where there are productive fields.

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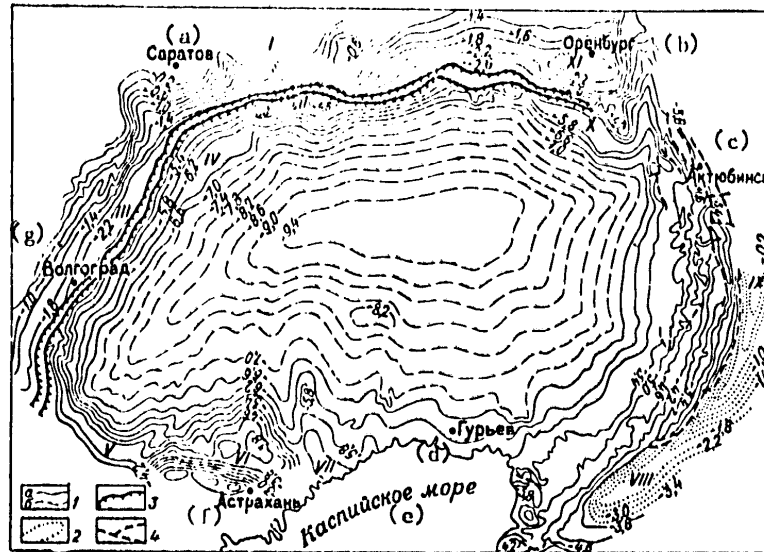


Figure 2. Structural Map of the Prekurgurian Surface (Seismic Level  $P_1$ ) of the Caspian Depression.

1-isohypses of seismic reflecting level  $P_1$  (km) corresponding to the Prekurgurian surface and, in places, to the Philipian level of the Kurgurian stage (a-known, b-probable); 2-same, for corresponding erosion surface of Paleozoic formations of the Yuzhno-Embenskiy [South Emba] and Mugodzharskiy uplifts; 3-tectonic escarpments; 4-fault dislocations.

Major tectonic elements: I-Pugachevskiy anticline. Uplift zones: II-Ozinkovskiy; III-Kamyshinsko-Balykleyskiy; IV-Dzhanybekskiy; V-Karakul'skiy. Uplifts: VI-Astrakhan; VII-Kobyakovskiy; VIII-Yuzhno-Embenskiy; IX-Mugodzharskiy; X-Troitskiy tectonic area; XI-Orenburg sweli.

Geographic names: a-Saratov; b-Orenburg; c-Aktyubinsk; d-Gur'yev; e-Caspian Sea; f-Astrakhan; g-Volgograd.

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It is necessary, in 1978-1980, to develop a minimum of two seismic profiles covering 400 km on this structure, using the correlation method of refracted waves [KMPV] and MOGT. Moreover, since the super-deep Biikzhal'skiy hole No 2 didn't reach planned depth, failing to cover the full thickness of the Carboniferous formations, the available machinery should be used to drill to a depth of 7.5-8.0 km for the purpose of studying the entire cross section of Carboniferous and Devonian rock. This is of fundamental importance to evaluation of the oil- and gas-bearing prospects in the southeastern part of the Caspian depression.

The Severo-Kaspiyskiy uplift zone (southern part of the Ural-Volga interfluvial area) were surveyed via widely separated KMPV profiles. The structure of its sedimentary mantle was not defined. The surface of the base and upper level of subsalt sediments (seismic levels F and P<sub>1</sub>, respectively) lie 7.5-8.0 and 5.5-6.0 km deep. The regional upheavals southward, toward the Caspian Sea proper, may very well rise to 5 km or less. Structural correlations between the Severo-Kaspiyskiy uplift zone and the Astrakhan protrusion are not in evidence. To give us a better picture of the structure of subsalt rock in this zone, we recommend continuing, primarily on dry land, regional MOGT seismic investigations using the old KMPV profiles and developing two new KMPV-MOGT surveys. Further work in the Caspian littoral will make it possible, on the one hand, to study the structure and lithology of subsalt complexes in the zone where they are at minimum depth and, on the other hand, will enable an understanding of the tectonic nature and situation of the Severo-Kaspiyskiy uplift zone. The Ozinkovski uplift zone extends north of the Caspian depression, with subsalt strata lying at a depth of 4-5 km. In this region, the seismic data for individual profiles are poorly correlated. To tie them in and confirm the presence of the Ozinkovski uplift zone, it is proposed to develop three regional KMPV-MOGT profiles with a total extent of 560 km, drill the planned Altatinskiy hole and extend its planned depth to 5.5 km to expose 700-1,000 meters of the subsalt formations.

The Troitskiy and Akbulakski protrusions, with subsalt rock at elevations of -4.0 to -6.0 km, are located on the northeastern periphery of the Caspian depression. There have been sparse KMPV surveys and, on small portions, detailed reflected wave [MOV] and MOGT work. The subsalt strata have not been drilled into. A series of KMPV-MOGT profiles is proposed for these uplifts, a portion of which profiles should intersect the Cis-Ural foredeep in order to study its deep structure and the nature of the connection with the southeastern edge of the Russian platform.

On the Sol'-Iletski protrusion, besides the parametric and exploratory wells being drilled, it is recommended that another parametric be put down (planned depth 5.5 km) to disclose the whole thickness of subsalt formations and evaluate oil and gas prospects of the Predevonian rock. Additionally, a parametric well (planned depth 5.5 km) should be drilled on the Akbulakski uplift to study the upper part of the subsalt formations.

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The northern edge of the Caspian depression between the Ozinkovskiy uplift zone and the Troitskiy protrusion is of undoubted interest with respect to oil- and gas-bearing potential. Seismic prospecting has established that the lower levels of the sedimentary mantle have sunk here to the north and are unconformably covered by the upper layers (with a dip to the south). This is evidently related to the existence of a protrusion of the base which extends in a latitudinal direction. Probably the Koshinskiy swell, evolved from Devonian formations, is also situated on this protrusion.

Prospecting operations which are concentrated in a narrow band do not throw light on the structure of the region as a whole, particularly with respect to base relief. To study it thoroughly and reveal structural connections with adjoining tectonic elements it is necessary to incorporate a number of meridional KMPV-MOGT profiles.

As far as the Astrakhanskiy protrusion is concerned, the main problem lies in upgrading the accuracy of the seismic prospecting work done on the subsalt formations. On a regional scale, it is necessary to more accurately define its connection with adjacent structures by means of two MOGT seismic profiles, and to study the cross section of the sedimentary mantle's lower levels via one parametric well (planned depth 7 km) in the central part, another on the northwestern dip and a third on the northeastern dip of the anticline.

On the western edge of the depression it is logical to continue work in the Kamyshinsko-Balykleyevskiy uplift zone and on the Karasal'skiy monocline.

The proposed regional geological-geophysical investigations are the minimum necessary for the initial-stage survey of major subsalt structures. They will make it possible to evaluate oil and gas prospects of the subsalt complexes and to concentrate further exploratory and regional operations on the most promising ones.

The question of further study of the western and northern rim of the Caspian depression is not examined in this article. We will note only that these areas have not been explored to a sufficient degree (particularly the lower levels of the sedimentary mantle) and that here, likely, there is an extensive reserve of as yet unrevealed local, productive uplifts.

The following recommendations are made regarding regional geological and geophysical investigations:

1. Use a uniform procedure for field geophysical observations and for processing the results.
2. Try to perform seismic prospecting in interdomal zones in order to reduce subsalt-structure-plotting errors due to insufficient knowledge of the propagation rate in the domes' salt-bearing mass.
3. Study the subsalt complexes by seismic prospecting all the way through them (including the base surface), with a tracing below the subsalt surface ( $P_1$ ) of a series of reference seismic levels ( $P_2$ ,  $P_3$  and others).



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4. When processing the seismic data, try to determine not only the structure of the subsalt complex but its substantive makeup as well.
5. In all deep wells carry out vertical seismic profiling, refracted wave seismic logging and other geological-geophysical studies for purposes of interpreting the wave field, learning the nature of the medium and the stratigraphic location of the seismic levels.

This is the basis for injecting refinements into the 1979-1980 plan for regional work in the Caspian depression, and the foregoing recommendations should be studied in the course of considerations for the 11th Five Year Plan.

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## PUBLICATIONS

### USING THE CRITICAL-PATH METHOD FOR MILITARY ORGANIZATION

Moscow SETEVOYE PLANIROVANIYE NA FLOTE (Programmed Evaluation and Review in the Navy) in Russian 1973 signed to press 18 Apr 73 p 2, 247-248

[Annotation and table of contents from book by V. D. Skugarev and L. V. Kudin, Voenizdat, 5000 copies, 248 pages]

[Text] The essence of the critical-path method is presented as a means for the scientific organization of military work in the Navy. Methods of constructing and processing critical-path diagrams which provide the basis for their use on ships are examined. Particular attention is given to the use characteristics of critical-path methods for planning and control in combat training, in headquarters operation, during organization of the training process in educational institutions and also during the planning and execution of scientific research work.

The book is intended for a wide group of naval officers. It will also interest officers of other branches of the Armed Forces, personnel of the shipbuilding industry, the merchant marine and commercial fleet and all who are practically involved in planning in one way or another.

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NEW IDEAS IN AUTOMATION

Moscow AVTOMATIZATSIYA: NOVYYE IDEI in Russian No 11, 1978 signed to press 23 Aug 78 pp 2, 3, 11-14, 33-34

[Annotation, table of contents and excerpts from the book by O. T. Tukeshev, Izdatel'stvo Znaniye, 62,590 copies, 61 pages]

Annotation

[Text] Discoveries made in recent years in the fundamental sciences and new equipment and technology using them permit a complex attitude toward the possibilities of automation from positions of a systems approach, that is, taking into consideration not only the technological but also the social and other aspects of the problem. The brochure is devoted to this. It is intended for a wide range of readers.

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Foreword

[page 3]

[Excerpts] According to data of the Central Statistical Administration, in the first half of 1978 instruments and spare parts for them and means of automation valued at 2.2 billion rubles were produced, and computer equipment and spare parts valued at 1.6 billion rubles. In the same period, 3,600 machines tools with numerical programmed control were made.

Features of Automation

[pages 11-14]

[Excerpts] Automated control systems (ASU). The development of ASU has been and is influenced by both technological and long-range socioeconomic

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factors such as the preservation of the environment, a shortage of energy and manpower, safety and the easing of working conditions. That influence is far from well-defined. The absence of servicing personnel directly at the objects of control made doubtful the safety of production when critical situations arise in the case of failure of means of automation. The release of the operator from routine labor on a specific production section did not free him from simultaneous observation at a control panel. The need to spend considerable time on the compilation and issuance of programs has led to a low efficiency of ASU.

Today it is a matter of the entire statewide pyramid of ASU of different levels: of objects, technological processes, productive enterprises, branch of the national economy and the entire national economy. In the final account a statewide automated system, an OGAS, gigantic in its complexity, had to be created, one intended to solve problems in the accounting, planning and control of the national economy on all levels.

Much has already been done on the path to the solution of that problem. One of the main problems facing the national economy is the creation of complex ASUPP (automated production enterprise management systems]. The work is being done in three main directions which envisage:

- automation of the control of technological processes (a development of the ASUPP);
- automation of the control of organizational-economic processes;
- automation of the prediction of the development of a given production.

Only the combination of those directions into a single whole permits the creation of an ASUPP. In many branches of the national economy this extremely complex problem has been successfully solved. The next stage of the ASU hierarchic pyramid is automated control systems of groups or associations of enterprises and of branches of the national economy.

The basis of those successes were achievements in the area of the mathematical description of technological objects and of identification theory, new results in reliability theory and the theory of schedules, and successes in the development of the principles of dual control and multiply connected regulation.

It also is important to note the introduction of systems of automated designing of automated control systems and the automated development of programs, and the creation of specialized data banks and packages of applied programs.

Among the new trends in the automation of any object is assurance of the possibility of its subsequent inclusion in an ASUTP (automated system for the control of technological processes), formulated by various departmental and interdepartmental documents. In turn, in the development of such a system its subsequent use in an ASUTP or branch of the national economy must be taken into account. These requirements are met by the creation of

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centralized structures of control from single dispatcher points and the installation of additional data transmission and remote control equipment.

Such an approach to the creation of means of automation, corresponding to the long-range problems in management of the economy, is successfully realized, for example, by the "Soyuzgazavtomatika" VNPO [all-union scientific production association] of the USSR Ministry of Gas Industry. The automated systems of gas fields, the compressor stations of main gas pipelines, underground gas storage and gas distribution stations, besides the automation of all local objects without exception, include units assuring the functioning of the ASUTP of the main pipeline. The combination of separate ASUTP's makes it possible to create a unified automated system for control of gas supply.

Almost 2,000 ASU's were introduced in the Ninth Five-Year Plan. Their repayment period was about 3 years on the average. But, for example, at the L'vov Television Plant the ASU paid for itself in 2 years. One of the first ASU's in our country was created at the Moscow "Moloko" Association. In spite of the "capricious" character of production and the fluctuations of the demand for it, the splintering of trading points, the mass of specialized transport and tens of contradictions, the ASU coped with the problems. The saving was more than a million rubles that previously were lost within the framework of only one association due to unoptimal management and insufficiently clear organization.

At each industrial enterprise there is the concept of the "operativka" -- a weekly (and sometimes daily) conference of the management personnel at which the state of affairs is made clear. An electronic computer gives far more precise, complete and objective information in counted minutes. The data output of the machine, with a complete picture of the work of the enterprise during the elapsed days, months or quarters, can be analyzed thoroughly in 10-20 minutes and a corresponding decision made.

Existing ASU's are unique man-machine systems in which man remains the principal actor. It is interesting to note that if the ASU fails at an enterprise which has introduced it, the enterprise probably will have to shut down. This unexpected turn corresponds completely to the words of Corresponding Member of the USSR Academy of Sciences N. N. Moiseyev: "It is important to understand now that the simple growth of industrial might, without qualitative change of all the informational basis of its functioning, without the organization of human labor, cannot give the desired effect but, on the contrary, leads to the erection of a Tower of Babel.

In the management of the national economy as a whole an ever-larger role is being acquired by special systems which permit predicting the scientific and technological possibilities, with simultaneous formulation of the corresponding goals, and also creating and "playing" models assuring the achievement of those goals. Absolutely new in that case is the requirement of

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constant renewal of the prediction and corresponding change of the national economic plan. Such a task cannot be solved by purely mathematical methods and the introduction of heuristic rules cannot help, in connection with which the Institute of Cybernetics of the Ukrainian Academy of Sciences has proposed a dialog model that envisages the direct participation of man. The model has been called the dialog system of planning, abbreviated as the "displan."

Up to now the correction of plans required just as much time and efforts as their compilation. The displan opens up completely new possibilities of using the enormous advantages of the socialist system of management.

A prerequisite for the practical realization of the displan is the State Network of Computer Centers (GSVTs) that has been created. It will include thousands of computer centers, including those servicing individual industrial enterprises and organizations. The symbiosis of man and electronic computer is now bringing surprising results and has made it possible to automate such especially creative processes as, for example, planning.

Automation of Discrete Technological Processes

[pages 33-34]

[Excerpts] Automation of auxiliary operations. The specialized "Sklad-78" exhibition was held with great success at the beginning of 1978. The slogan of the exhibition was the complete mechanization and automation of transport, warehousing, loading and unloading work. Among the exhibits were numerous types of containers, automated loaders, automatic machines, shelving and storage where the articles are untouched by human hands.

Imagine that the elevator of your apartment is able to move not only up and down but also along the floors and to deliver you directly to the door of your apartment. Now let the elevator have a mechanical hand which pushes and pulls freight, and you obtain an idea of the contemporary automated warehouse. The apartments must just be replaced by cells of shelving. Such a warehouse with the height of a ten-story building has been constructed, for example, at the AvtoZIL Association. An electronic computer controls maneuvers of the elevators. It also keeps precise records of stocks, instantly responds to inquiries about quantities, and receives and issues at first request containers of parts.

In the future, man's intervention will not be required at all. Needed parts, upon the request of an electronic computer of any ASUTP, go in containers with an addressing system from storage directly to an automatic line.

The effectiveness of automation of warehousing and transport work is 5-10 times as high as that of basic technological work. Thus the expenditures required for the release of 10-15 transport and loading workers amount to 10,000-20,000 rubles, and an automatic line which releases the same number of workers costs 100,000 rubles on the average.

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Tasks solvable with wheeled intra-plant transport are in their structure similar to the tasks of reloading containers from ships to rail or truck transport. The protection of raw materials on open areas and the warehousing and shipment of finished goods can be automated through the use of practically ready-made solutions. An automated system of reloading containers from ships to land means of transport is in operation, for example, at the port of Il'ichevsk. It was designed by specialists of the Institute of Problems of Control under the supervision of G. K. Sorokin. The electronic computer not only plans the optimum disposition of containers on the area of the port, issuing orders and keeping a precise record of the work of the container loaders (automatic container movers), but at any given moment reports data on the location of each container, the presence of unoccupied places and the optimum change of the container processing program during variation of the starting information. The system surpasses the world level.

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PUBLICATIONS

COMPUTER SIMULATION USED TO STUDY DIGITAL TRANSMISSION SYSTEMS

Moscow MASHINNIYE METODY ISSLEDOVANIYA TSIFROVYKH SISTEM PEREDACHI (Machine Methods for Studying Digital Transmission Systems) in Russian 1978 signed to press 13 Jan 78 p 2, 144

[Annotation and table of contents from book by L. N. Oganyan and L. V. Pankov, Izdatel'stvo "Svyaz'", 4800 copies, 144 pages]

[Text] Fundamental problems in the study of the noise-resistance of a digital transmission system and its components are formulated on the basis of analysis of the general construction principles of digital transmission systems. Their solution requires the use of simulation methods on computers. Principles for developing machine models of digital transmission systems are examined and algorithms for an analytical and simulated model of digital transmission system components are given in ALGOL-60 (ALGAMS).

The book is intended for scientific personnel engaged in designing and studying digital transmission systems using digital computers.

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PUBLICATIONS

ULTRASONIC MICROWELDING TECHNOLOGY FEATURED IN NEW BOOK

Minsk UL'TRAZVUKOVAYA MIKROSVARKA (Ultrasonic Microwelding) in Russian  
1977 signed to press 20 Jun 77 p 2-8, 328

[Annotation, Foreword and Table of Contents from book by Vladimir Mikhaylovich  
Koleshko, Izdatel'stvo "Nauka i Tekhnika," 3,200 copies, 328 pages]

[Text] Problems of the theory and technology of ultrasonic microwelding are considered in the book. The latest data on the main principles and characteristic features of formation of a microwelded joint in the solid and liquid phases under conditions of activation by ultrasonic oscillations are presented. Data are presented on theoretical calculation, development and investigation of acoustic systems for microwelding. The results of investigating the structure, mechanical and electrical properties of microwelded joints are given. New methods and development of methods and design of equipment for conducting the microwelding process are theoretically and experimentally justified.

Intended for a wide range of scientific and engineering-technical personnel of industrial enterprises and design and scientific research organizations and may also be useful to teachers, post-graduate students and students specializing in the field of electronic technology.

Foreword

Science and technology are being developed at exceptionally rapid rates at the modern stage. Special attention is being devoted to intensification of various production processes. It is intensification that makes it possible to solve the problem related to the need to significantly increase labor productivity in various branches of the national economy of the country and to increase product quality. Science is being transformed to the main productive force and has been called upon to have a deep, ever increasing revolutionizing effect on various spheres of its practical applications, the possibilities of which are inexhaustible. Science is faced with grandiose tasks to improve efficiency, further expansion of fundamental research and concentration of forces on the most important and promising

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trends of scientific-technical progress. The scientific and technical revolution makes its imprint on development and progress in the field of electronics. The vigorous development of automation and mechanization of production processes is related to the ever increasing use of computer technology, various electronic instruments and devices in the national economy. A great deal of attention is devoted in this case to microminiaturization of individual functional components and to manufacture of the latter in complex versions.

Important advances have been achieved during the past few years in the field of production and use of semiconductor devices, integrated and hybrid circuits whose high dependability is determined not only by the quality of the initial materials, but also to a significant degree by perfection of technology at different stages of development of the device or circuit. Successful manufacture of semiconductor devices and microcircuits requires solution of the problem of developing permanent contacts between various components, specifically joining of the semiconductor crystal with its functional components to the housing of the device and also joining metal leads to thin-film contact surfaces of the planar edge of the crystal and to the external leads of the device housing. At the same time, the continuous growth of the number of components in each microcircuit, i.e., development of large integrated circuits, leads to a vigorous increase in the number of contacts whose quality largely characterizes the efficiency and dependability of micro-electronic apparatus. The complexity of making high-quality microwelded and soldered joints consists in the fact that the method of producing joints and the materials used for this should provide good electrical contact, high mechanical strength while retaining the integrity and required physical properties of the joined microcomponents, high resistance to vibrations and impact loads and efficiency over a wide temperature range.

The existing production processes of producing dependable contacts in manufacture of semiconductor devices and integrated and hybrid circuits are based on the use of pressure, temperature and various methods which intensify the process of formation of the joint both in the solid and the liquid phase. Ultrasonic microwelding occupies a special place in the technology of producing dependable and stable bonds between various materials.

The advances of ultrasonic microwelding are inseparably related to the advances of solid-state physics, the physics of metals and physical metallurgy, chemistry and physicochemical mechanics, acoustics and other sciences, with the use of new devices and apparatus. These advances permit a deeper understanding of the essence of the physicochemical processes on the surface of a solid and study of new phenomena and principles which permit development of production processes which ensure production of articles with enhanced electrical, mechanical and chemical properties.

The leading position in development of fundamental problems of the theory and practice of ultrasonic microwelding belongs to acoustics, solid-state physics and physicochemical mechanics. It is true that the advances of

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these branches of modern science also affect to a significant degree all the various production processes of microelectronics in modern industrial production.

Equipping industry with high-quality modern equipment in production of semiconductor devices and integrated and hybrid circuits for various production processes, including those for ultrasonic microwelding, which include highly productive automatic machines and automatic lines which meet modern requirements, with the increasing complexity and an increase in the volume and rate of assembly of devices requires reliable data on the design of ultrasonic systems and on the principles of materials behavior under conditions of plastic deformation in an ultrasonic field, ever more complete data on the nature of formation of the structure and properties of joints produced by ultrasonic microwelding.

Eutectic contact-reactive soldering and joining by using glass, epoxide paste, soft solder, conducting glue, eutectic alloys and their combinations are now used extensively to join semiconductor crystals with their functional components to the housing of the microcircuit device. Among the known methods of welding during wire assembly of microelectronic devices, thermocompression, contact point microwelding with unilateral and bilateral arrangement of the electrodes or with a dual electrode, pressure microwelding with pulsed indirect heating, cathode-ray, laser and microplasma welding are used along with ultrasonic microwelding.

A number of monographs and survey papers has been published during the past few years which reflect some theoretical and technological problems that may also occur during microwelding and soldering during production of semiconductor devices and integrated and hybrid circuits [1-30]. Soviet scientists have made an important contribution to worldwide science in the field of studying the principles of electric-arc welding, thermocompression microwelding, pressure welding, laser and cathode-ray welding and ultrasonic and diffusion welding in a vacuum. Modern production processes of welding various materials and also highly productive and dependable equipment for accomplishing them have been worked out.

One may essentially find everything that is known in the field of the science of metals and the mechanics and physics of a given physicochemical process in numerous papers devoted to theoretical and experimental study of various methods of welding. Advances in the field of welding theory and practice, related to development of traditional trends, have been widely illuminated in textbook and special scientific-technical literature. Therefore, problems of the development and current state of welding theory and its practical applications are not considered on a broad scale in the given book, but references to the literary sources used are given in the outline of the material.

It should be noted that there is now a number of problems both in the field of theory and practice of forming the joints of homogeneous and heterogeneous materials in the solid and liquid phases which must be solved.

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The economic potential of the state at the modern stage is determined to a significant degree by the level of automation and mechanization of various production processes which largely depends on the quality and volume of output of products from the electronics industry. The higher the qualitative and quantitative indices of semiconductor devices and integrated and hybrid circuits, the higher their efficiency of use in the national economy of the country. Various methods of microwelding used at the modern stage of production development are characterized by progressive production processes. This is especially true of ultrasonic pressure microwelding with regard to its advantages. Therefore, the greater the number of various methods of ultrasonic microwelding is used in the national economy, the more feasible it is to use ultrasonic equipment and the higher the efficiency of the entire production process will be in producing microelectronic devices and circuits. However, various methods of microwelding and all the technological principles of producing products which were effective yesterday are now negated by the appearance of new scientific ideas and developments based on extensive introduction of intensification using acoustic waves. Hence, the need to constantly improve the various production processes and to study the principles of formation of the real structure and properties of the produced articles is quite obvious. Continuous improvement of the efficiency of production processes and universal mechanisms and machines used in the national economy places ever newer requirements on production and in some cases also requires development of essentially new products. The main and most general requirement which is placed on the entire electronics industry and on microelectronics specifically is continuous improvement of the quality and reliability of products with the ever increasing volume of industrial production.

Development of new scientific ideas for microelectronics is directly related to development of the theory and practice of developing new functional components, study of their structure and properties, finding new materials for accomplishing them and also design and development of new machines and production processes and improvement of existing ones. In this case all investigations in this field should be organized on a basis which permits a contribution to scientific and technical progress in the best manner.

Further development of the theory and practice of ultrasonic microwelding is obviously related to solution of a number of problems, among which those of primary importance are development of fundamental theoretical positions and methods of the most efficient use of various types of energy of the acoustic field, designed for use of ultrasonic and hypersonic frequency, and various types of acoustic oscillations; increasing the quantity and quality of the ultrasonic equipment and tools used and increasing their productivity of production processes; development of nondestructive methods of testing the quality of joints and development of highly productive automatic machines, automatic lines and automated control systems of the production process of microcircuit assembly; reducing the time of development and materialization of the most effective scientific ideas and principles related both to improvement of quality and to improvement of production

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processes which ensure production of joints with previously given properties; and expansion of the nomenclature of products produced by ultrasonic microwelding, which is directly related to an increase of the quality, reliability and durability of various semiconductor devices and integrated and hybrid circuits.

The need to take into account these factors which determine not only the prospects of use but also the quality and effectiveness of using various methods of ultrasonic microwelding is manifested in all aspects of organizing production of microelectronic devices in the country and generates a number of interrelated problems.

It has undoubtedly now been proved on the basis of extensive experimental and theoretical material that the properties and reproducibility of the quality of microwelded joints depend on conditions of the entire aggregate of production regimes during production of them. Knowledge of the physicochemical processes occurring during different production conditions of microwelding is required for design of microwelding equipment, selection and calculation of optimum parameters of creating dependable contacts in metal-metal and metal-semiconductor systems with the required mechanical and physical properties.

It is of considerable interest to conduct investigations to determine the principles and characteristic features of formation of the fine structure of gold-silicon and aluminum-silicon systems in the liquid phase and gold-gold, gold-aluminum, aluminum-aluminum and aluminum-gold systems in the solid phase during plastic deformation in the ultrasonic field in the zone of forming the joint of semiconductor device and integrated circuit components and also to determine the effect of the initial structure of the joined materials on the nature of joint formation. The state and structure of the surface layers are directly related and determine to a significant degree the quality and properties of the produced joints. A knowledge of the principles of surface phenomena occurring at the interface of joined materials permits more complete representation of the physical characteristics of the processes occurring in the outer layers of solids contacted during ultrasonic microwelding. Research data are senseless without a knowledge of the effect of acoustic waves on the properties of the solid, since the nature of the acoustic field significantly affects the physicochemical processes occurring on the surface, the interphase interfaces and in the volume of the solid.

Taking the foregoing into account, the goal of studying and outlining in compact form the main data on formation of the constituent joints of semiconductor devices and integrated circuits by plastic deformation in the ultrasonic field in the liquid and solid phases and also to determine methods of designing equipment for accomplishing the microwelding process were posed in this paper. The concluding step of the paper is practical use of the results of investigations in production and determination of the further direction of research related to improvement of the technology of modern discrete semiconductor devices and large integrated circuits.

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An attempt was made in the book to relate jointly the entire complex of phenomena studied by the author.

Since a book on ultrasonic microwelding is being published for the first time it is naturally not devoid of deficiencies. All comments and desires of the readers will be gratefully accepted.

The author feels it his duty to express gratitude to academicians of the BSSR Academy of Sciences, Doctor of Technical Sciences, Professor V. P. Severdenko and to Doctor of Technical Sciences L. I. Gurskiy for valuable advice, comments and attention to the work. V. Ya. Sunka and A. V. Gulay rendered great assistance in conducting a number of experiments.

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# PUBLICATIONS

## MECHANIZING AGRICULTURAL DATA PROCESSING

Moscow ORGANIZATSIYA MASHINNOY OBRABOTKI EKONOMICHESKOY INFORMATSII V SEL'SKOM KHOZYAYSTVE (The Organization of Automatic Processing of Economic Information in Agriculture) in Russian 1978 signed to press 2 Mar 78 p 2, 355-358

[Annotation and table of contents from book edited by N. T. Baranovskiy, Izdatel'stvo "Statistika", 10,000 copies, 360 pages]

[Text] This book presents the subjects of the national economic value of mechanizing management work, computer systems and automatic processing of data in an automated control system (OASU) for a sector of industry and also the theoretical foundations for planning and operating RMSS's [republic machine calculating stations], RIVS's [republic information-computer systems], VTs's [computer centers], RIVTs's [republic computer centers] and other computer facilities serving agricultural enterprises.

Scientific and methodological principles for systems organization of mass data and its processing by punchcard processing equipment and computers are given along with methods for the description and processing of economic information on computers in algorithmic languages.

The instruction manual is intended for students of economic specialties in agricultural schools and may also be used by the employees of scientific research institutes, graduate students and experienced personnel working in this field.

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PUBLICATIONS

ABSTRACTS FROM THE PUBLICATION 'APPLIED GEOPHYSICS'

Moscow PRIKLADNAYA GEOFIZIKA in Russian No 90, 1978 pp 3, 17, 31, 46, 56, 69, 78, 84, 95, 105, 110, 119, 129, 135, 147, 157, 166, 170, 175, 188

UDC 550.834

GEOPHYSICAL FIELD ACCOUNTING IN DATA PROCESSING FOR AN OPTICAL SYSTEM WITH RANDOM DETUNING PARAMETERS

[Abstract of article by Polshkov, M. K., and Kuznetsov, A. I.]

[Text] An analysis of optical systems for processing information given uncontrolled detuning system elements which are observed in industrial practice is presented. Expressions were derived for a signal in a Fourier plane and following spatial filtration relative to the parameters of the system's defocusing. Simplified methods for evaluating and calculating the influence of detuning on a signal under a well defined experiment geometry were examined.

1 table, 1 illustration and 6 bibliographical references.

UDC 550.834.5

CORRECTION OF SEISMIC CONSTRUCTIONS IN LAYERED MEDIA WITH CURVED SURFACES

[Abstract of article by Nevinnyy, A. V.; Zemtsov, Ye. Ye.; Durkin, A. T.; and Ramazanova, S. M.]

[Text] The construction of seismic surfaces in layered media with curved demarcation boundaries is described. The question concerning refinement of a high-speed stratified medium model in the construction process was examined. An algorithm for calculating the coordinates of the reflected layered elements in complicatedly constructed media is presented which allows for the refinement of the status of reflected surfaces and the forecasting of the magnitude of the velocity intervals.

1 table and 4 illustrations.

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UDC 550.834.5

THE INVERSE PROBLEM OF SEISMIC REFLECTION SHOOTING FOR ALTERNATE SEISMIC  
WAVE VELOCITIES

[Abstract of article by Piyp, V. B.]

[Text] A method is proposed which would allow one on the basis of a MOV [reflected wave method] time profile to determine a certain two-dimensional continuous velocity function which approximates the distribution of the true velocities in the profile. Algorithms are derived with the aid of which one may calculate the mean time profile and by comparing it with the original one may evaluate the level of differentiation between the actual velocity distribution from the homogeneous function.

4 illustrations and 9 bibliographical references.

UDC 550.834.5

ALGORITHMS OF INTERPOLATION FOR EFFECTIVE AND INTERVAL VELOCITY DETECTION

[Abstract of article by Karasik, V. M.]

[Text] Various aspects of interpolation along the time axis for reflected wave parameters are examined. An evaluation is performed of errors under a widely dispersed linear interpolation of the gamma value which is proportional to the time gain along the in-phase axis. Optimized algorithms are analyzed for interpolating  $1/(\gamma + \Delta\gamma)$ , which in the absence of  $\Delta\gamma$  displacements agrees with the more accurate hypothesis concerning the uniformity of velocities between two reflecting levels.

1 table, 3 illustrations and 3 bibliographical references.

UDC 550.834.05

A METHOD FOR CALCULATING HIGH-SPEED HETEROGENEITIES IN THE UPPER PART OF  
THE PROFILE WHILE RECORDING REFLECTED WAVES IN CDP DATA PROCESSING

[Abstract of article by Lozinskiy, Z. N.]

[Text] A method is described for correcting random and regular component errors in statistical corrections based on their utilization as source information for the  $t_0$  line of a reflected wave in the OTV [total point eruption] and OTP [total point reception] time profiles. Examples of the method's testing against simulated and actual materials are presented to illustrate the effectiveness of its use.

5 illustrations and 8 bibliographical references.

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UDC 550.834.05:519

THE DIGITAL SIMULATION OF A WAVE FIELD CONSIDERING THE REFRACTION BASED ON THE FERM PRINCIPLE

[Abstract of article by Matveyenko, G. V.]

[Text] An algorithm is refined for digital simulation of wave fields by the utilization of the introduction into the model of refraction limits of undefined configuration. The programmed solution includes the original algorithm for rapid calculation of beam trajectories based on the Ferm principle. The results of the program's application attest to the considerable influence of the focusing factor on the dynamics of wave description and on the necessity for calculating the beam refraction in tasks of time intensive transformations.

3 illustrations and 5 bibliographical references.

UDC 550.834.5

THE EFFICIENCY OF THE CDP TECHNIQUE FOR A DIPPING OCCURRENCE OF REFLECTING SURFACES

[Abstract of article by Kotlyarov, V. I.]

[Text] It is shown that under conditions when reflecting surfaces are characterized by inclination angles of more than  $10^\circ$ , the efficiency of the CDP technique decreases. Graphs are presented which depict within which inclined angular relationship of multiple generatrices and reflecting surfaces the multiple reflections are summarized coherently. A conclusion is reached concerning the necessity for calculating the inclination angle in the CDP method.

3 illustrations.

UDC 550.834.05:519

COMPUTER PROCESSING OF GSZ [Deep Seismic Sounding] AND KMPV [Seismic Refraction Method] SEISMOGRAMS

[Abstract of article by Pavlenkova, N. I.; Pilipenko, V. N.; and Dzyuba, V. V.]

[Text] A method is proposed for computer processing of GSZ and KMPV seismograms which permit the reception of provisional profiles similar to the MOV profiles, and thereby utilize all the existing methods for processing the recordings -- summation, merging, various forms of filtration, etc. The technique is based on the method for reduced travel time curves and proposes a multiple rewriting of portions of the interference oscillations with various velocity reductions. This ensures an uninterrupted recording in a provisional profile and allows for the interpretation of the interference zones.



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5 illustrations and 6 bibliographical references.

UDC 550.834.084

FREQUENCY CHARACTERISTICS FOR THE 'EARTHQUAKE-SHOCK RECORDER-CABLE-AMPLIFIER INPUT' SYSTEM

[Abstract of article by Ryabkov, V. V.; Polyakov, A. P.; and Antipin, Yu. G.]

[Text] An algorithm and a computer processing program is described for the frequency characteristics of a group of earthquake-shock recorders which are included through a joining cable to an amplifier input. The program which was developed allows in each specific situation for the calculation with sufficient accuracy of the frequency characteristic of the "Earthquake-Shock Recorder-Cable-Amplifier Input" system and thereby significantly simplify the development of seismic channels with given properties.

1 table, 6 illustrations and 5 bibliographical references.

UDC 550.837.6

SEARCHING FOR BENCHES OF SALINE SUBSTANCES BY THE TELLURIC CURRENT METHOD

[Abstract of article by Anishchenko, G. N.]

[Text] The applicability of the TT [telluric current] method for searching for benches of saline substances is evaluated on the basis of the theoretical calculations of a telluric current field over a two-dimensional model of a two-level profile with an escarpment of insulated substructure.

It is shown that the graphs for a median field intensity over a sharply inclined escarpment, a vertical grade and a bench are similar and can hardly be used to establish the differences in the models depicted above.

3 illustrations and 7 bibliographical references.

UDC 550.837.6(538.32)

TRANSIENT SOUNDING IN A THIN CONDUCTING LAYER WITH DISSEMINATED INHOMOGENITIES OF CONDUCTIVITY

[Abstract of article by Glechikov, V. A., and Sidorov, V. A.]

[Text] The earth's crust is nonhomogeneous in thickness and longitudinal conductivity, and frequently can be presented in the form of conducting layers with the inclusions of some longitudinal conductivity.

Examined in the article is an approach to average the parameters of the non-homogeneous surface for calculating the heterogeneity through electromagnetic

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soundings. It was shown that the inclusion of heightened conductivity influences the redistribution of the vortex field more strongly than the inclusion of lowered conductivity.

4 bibliographical references.

UDC 550.370:550.837

THE APPLICATION OF A STOCHASTIC ROCK MODEL IN THE THEORY OF INDUCED POLARIZATION

[Abstract of article by Lobanov, Ye. M.]

[Text] In the application of the method for induced polarization a stochastic rock model is examined. An integrated equation is derived for the structural function. The results of its digital solution are stated by a method of normalization through the use of raw data which has been measured to a high degree of accuracy -- on the order of 1%.

12 bibliographical references.

UDC 550.837.82

AN APPROXIMATION THEORY OF TRANSIENT SOUNDING IN MAGNETIC MODIFICATION

[Abstract of article by Gubatenko, V. P.]

[Text] As examples for the formation of a vertical magnetic dipole field which has been positioned above a homogeneous and nonhomogeneous fine conducting plate, criteria are given for the application of an approximate solution. It is shown that through the proper selection of a working model an approximate solution gives satisfactory results in the region of the early stages in the process of field formation.

2 illustrations and 11 bibliographical references.

UDC 550.838.016

CIRCULAR MAGNETIC ANOMALIES OF THE RUSSIAN PLATFORM AND THEIR RELATION TO CIRCULAR MAGNETIC STRUCTURES

[Abstract of article by Moshinskaya, I. P.]

[Text] It is shown that circular regional and local magnetic anomalies of the Russian platform, the circular tectonic formations of the moon and ground circular magnetic structures consist of elements similar in form and connected by an analogous shape. The conclusion is reached that the circular magnetic structures which are similar to the circular lunar craters and seas correspond to the circular magnetic anomalies of the Russian platform. Geologic data are presented which support the validity of this conclusion.

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Examined is the connection between the position of the regional circular magnetic anomalies of the Russian platform and the location of ore, coal, oil and gas deposits which have a well defined practical interest.

1 table, 3 illustrations and 10 bibliographical references.

UDC 550.831.016

THE INTERPRETATION OF RESIDUAL GRAVITY ANOMALIES

[Abstract of article by Golizdra, G. I.]

[Text] In a series of examples errors are shown in the quantitative interpretation of local gravitational anomalies which arise as a result in sufficiently taking into account the redistribution of mass to the exclusion of the regional background. These errors are especially great under variable mass densities which create local and regional fields.

6 illustrations and 14 bibliographical references.

UDC 550.831.23.084

INVESTIGATION OF THE NONLINEARITY OF THE REVOLUTION VALUE OF A GRAVIMETER COUNTER

[Abstract of article by Nemtsov, L. D., and Romanov, B. S.]

[Text] Examined are certain factors which appear as the sources for errors in the results of measurements with gravimeters which contain crystal sensory systems constructed on the Golitsyn seismograph principle with two types of construction for the compensation assembly: gated and non-gated. Evaluations of the influence of the installation of a compensation spring, the slope of its arm, the instability of its linear tension and the irregularity of the micrometric screw are presented. Recommendations on the application of the two types of construction for the compensation assemblies are given.

3 illustrations and 4 bibliographical references.

UDC 550.832.441

THE APPLICATION OF SYNCHRONOUS ORTHOGONAL DETECTION FOR RECORDING OF SONIC LOG PRIMARY SIGNALS

[Abstract of article by Lin'kov, V. A.]

[Text] Reported are questions pertaining to the application of synchronous orthogonal detection through processing and recording of geophysical signals which describe the wave processes. Examined are questions concerning increasing the accuracy in determining the dynamics of amplitude and frequency composition of the AK [acoustic logging] signals.

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2 illustrations and 4 bibliographical references.

UDC 550.832.053

THE ASYMPTOTES OF EXTREME CURVES OF BOREHOLE SOUNDING

[Abstract of article by Al'pin, L. M., and Bondarenko, M. T.]

[Text] Examined and evaluated are various methods for determining the asymptotic values of apparent resistance. Through grid modeling in a homogeneous field asymptotes for curved borehole sounding in fine strata are derived without penetration.

1 table, 3 illustrations and 5 bibliographical references.

UDC 550.832.53

THE EFFECT OF ROCK DENSITIES ON THE RESULTS OF NEUTRON BOREHOLE MEASUREMENTS

[Abstract of article by Rezvanov, R. A.]

[Text] Examined is the approximation method for calculating the effect of rock density on the neutron method readings. The technique is based on utilization of the L-equivalency principle. Nomograms are calculated for the introduction of density influence corrections into the readings of the neutron methods. The utilization order of the nomograms through interpretation of the data from the neutron methods is described with the objective of determining the porosity and the gas saturation of the strata.

4 illustrations and 6 bibliographical references.

UDC 550.837+518.517.948

THE SOLUTION OF THE INVERSE PROBLEM OF RADIOACTIVE LOGGING BY THE REGULARIZATION METHOD

[Abstract of article by Timonov, A. A., and Tanana, V. P.]

[Text] The formulation of the general inverse problem of radioactive logging is given. A comparative analysis of the known methods for its solution are presented. A conclusion is reached concerning the fact that the most promising method is A. N. Tikhonov's. It is shown that the solution of the general inverse task of RK [radioactive logging] leads to the solution of the implicit operator equation of the I-type with the approximately given operator by the regularization method. The algorithm for the approximate solution of the inverse problem of gamma-gamma logging by single dispersion is presented.

11 bibliographical references.

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PUBLICATIONS

LIST OF SOVIET ARTICLES DEALING WITH COMPOSITE MATERIALS

Moscow GOSUDARSTVENNIY KOMITET SOVETA MINISTROV SSSR PO NAUKE I TEKHNIKE. AKADEMIYA NAUK SSSR. SIGNAL'NAYA INFORMATSIYA. KOMPOZITSIONNYYE MATERIALY in Russian Vol 3, No 19, 1978 pp 3-6

[Following is a listing of Soviet entries from SIGNAL'NAYA INFORMATSIYA. KOMPOZITSIONNYYE MATERIALY (SIGNAL INFORMATION.COMPOSITE MATERIALS), a bibliographic publication of VINITI. This listing is from Vol 3, No 19, 1978]

[Excerpts]

2. Investigation of interaction in the system of the rare-earth element, tantalum. Bogdanova, Z. P., Keshishyan, T. N., Vlasov, A. S., Chupina, M. S., Skidan, B. S. "Tr. Mosk. khim.-tehnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 19-21.

4. Effect of high temperature casting and aging on the quality of bimetallic steel-copper wire. Yudin, I. K., Makhneva, Ye. K., Levin, Ya. N. "Teoriya i praktika pr-va metizov." Sverdlovsk, 1977, 116-120.

8. Investigation of adhesive interaction between unlike refractory metals. Kopichev, Yu. N. "Polucheniye i issled.svoystv novykh materialov." Kiev, 1978, 23-26.

11. P. Method for manufacturing two-ply pipes from steel tapes. Blinov, Yu. I., Tkachenko, V. A., Lipkin, Ya. N., Usov, V. A., Ronis, L. D., Grekhov, I. A., Slavin, V. B., Popovtsev, Yu. A. [Ural'sk. NII trubn. prom-sti, Sinarsk. trubn. z-d.] Avt. sv. SSSR (V23 P3/02); No 556021, zayavl. 28. 11.75, No 2300206, opubl. 21. 0677.

13. Stresses in metal-ceramic films of the  $(\text{Fe-Ni})_{1-x}(\text{SiO})_x$  system. Zhigalov, V. S., Frolov, G. I. "Fiz. met. i metalloved.," 1978, 45, No 6, 1289-1291.

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17. On mechanisms for rupturing orthogonally-reinforced composite materials under plane stress. Partsevskiy, V. V., Strel'nikova, N. L. "Tr. Mosk. energ. in-ta, " 1978, No 353, 30-34.
18. Nonlinear-elastic deformation fo dispersion-filled composites. Partsevskiy, V. V., Yakovlev, A. A. "Tr. Mosk. energ. in-ta," 1978, No 353, 34-37.
19. Effect of stratifications on the durability of a three-ply core under compression. Kurzin, A. A. "Tr. Mosk. energ. in-ta," 1978, No 353, 37-41.
20. Durability of multilayer plates in a supersonic stream of gas. Romanyuk, V. I. "Tr. Mosk. energ. in-ta," 1978, No 353, 20-24.
22. Micromechanical theories of strength. Chamis, K. "Kompozitsion. materialy. T. 5. Razrusheniye i ustalost'." M., 1978, 106-165.
31. Investigation of some properties of combined fibers of silicon carbide and graphite. Ivanov, A. V., Keshishyan, T. N., Vlasov, A. S. Bogdan, V. F. "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 32-35.
32. Investigation of the microstructure and some properties of fibers made of silicon nitride and combined fibers of silicon nitride and silica. Ivanov, A. V., Keshishyan, T. N., Vlasov, A. S. "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 44-47.
35. A new class of composite materials using eutectic metal oxide systems. Bogdanova, Z. P. Keshishyan, T. N., Vlasov, A. S. "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 26-28.
36. Study of conditions for obtaining stronger composite materials. Vlasov, A. S., Chernetskaya, N. S., Morozova, V. A. "Tr Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 16-18.
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38. Relaxation of initial stresses in the process of winding products made of composite materials. Murzakhanov, R. Kh. "Tr. Mosk. energ. in-ta," 1978, No 353, 41-44.
39. On the mechanism of compression in metal-ceramic materials. Gutnova, L. B., Vlasov, A. S., Kostikov, V. I., Fomina, G. A., "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," No 98, 29-31.
40. Self-lubricating iron coatings with oxides, carbides and borides. Borodin, I. N. "Poroshk. metallurgiya," 1978, No 2, 26-29 (Engl. abstract).

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43. Investigation of some properties of metal-ceramic composites. Gutnova, L. B., Vlasov, A. S., Kostikov, V. I., Skidan, B. S., Fomina, G. A. Shepilov, I. P. "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 12-13.
44. Composite ceramics with greater permittivity using a matrix of quartz glass and a rutile modifying phase. Popil'skiy, R. Ya., Beresnevich, L. A. "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 7 - 11.
49. Investigation of capillary penetration of liquids in metal-polymer compounds. Pinchuk, L. S. "Vestsi AN BSSR. Ser. fiz. tekhn. n., Izv. AN BSSR. Ser. fiz.-tekhn. n.," 1978, No 2, 119-122 (Engl. abstract).
54. Point welding of composite materials of the aluminum-boron system. Ryazantsev, V. I., Orlov, D. B., Shavyrin, V. N. "Svaroch. pr-vo," 1978, No 5, 18-21.
55. All-Union Conference on "Using fibrous refractory materials for lining industrial furnaces." Shakov, I. I., Gaodu, A. N., Kutukov, V. F. "Ogneupory," 1978, No 7, 51-54.
58. Composite thick-film resistors using molybdenum boride. Bulavin, I. A., Koshelev, N. I., Yakovlev, B. Ya. "Tr. Mosk. khim.-tekhnol. in-ta im D. I. Mendeleyeva," 1977, No 98, 48-52.
60. K. Modern methods for hard-facing and hard-facing materials. Tsz. dokl. I Vses. nauch.-tekhn. konf., Khar'kov, 1978. Editor Dudko, D. A., Nauk. dumka, 1978, 131 pages, 90 illustrations.
85. P. Charge for manufacturing composite materials. Karpinos, D. M. Grosheva, V. M. Mikhashchuk, Ye. P., Rutkovskiy, A. Ye., Akhmetshin, M. A., Kalinichenko, V. I. [In-t probl. materialoved. AN USSR]. Avt. sv. SSSR (SO4 V 35/10, S 04 V 35/70), No 576302, zayav. 3.05.76, No 2356758, opub. 21.10.77.
87. Synthesis and investigation of composite materials using low-melting point lead-silicate glass and condenser ceramics. Dyatlova, Ye. M., Shamkalovich, V. I., Minenkova, G. Ya., Protasevich, G. I. "Steklo, sitally i silikaty (Minsk)," 1978, No 7, 117-123.
88. Composite ceramics with higher permittivity using a matrix of quartz glass and a modified phase -- rutile. Popil'skiy, R. Ya., Beresnevich, L. I., "Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva," 1977, No 98, 7-11.

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